PARTS

REV. 7 - 20 - 9

CLEAN SWEEP

CANDY CRANE MANUAL

INCLUDING DISPENSING AND FILLING INSTRUCTIONS AND SUGGESTIONS

SMART
INDUSTRIES CORP., MFG.

1626 DELAWARE AVE. • DES MOINES, IOWA 50317 U.S.A.
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***(b)** Such products are returned prepaid to **Seller's** plant; **and sent back C. 0. D.**
***(c)** Seller's examination of said product discloses to Seller's **satisfaction that such alleged defects existed** and were not caused by accident, misuse, neglect, alternation improper repair, installation or improper testing.

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CANDY CRANE

DISPENSING AND FILLING INSTRUCTIONS AND SUGGESTIONS

CANDY SUGGESTION:

- INDIVIDUALLY WRAPPED HARD CANDIES (REQUIRED BY THE HEALTH DEPARTMENT)

EXAMPLE SOURCE:

- "FARLEYS BRAND" PARTY PACK MIX

AVAILABLE AT:

- PACE MEMBERSHIP WAREHOUSE
- SAM'S WHOLESALE CLUB

APPROXIMATE COST:

- $.97 PER POUND - SOLD IN 5 LB. BAGS (APPROX. PRICE AS OF JULY 1993)

OTHER SUGGESTED FILLERS:

- BASEBALL CARDS -WRAPPED SUCKERS

FILLING INSTRUCTIONS:

- FILL CANDY TO FRONT FENCE LEVEL AND SLOPE UPWARDS TOWARDS BACK OF THE GAME.
- IT TAKES APPROXIMATELY 65 - 70 POUNDS TO FILL THE FIRST TIME

WARNING:

IT IS NOT RECOMMENDED TO USE CHOCOLATE OR CHOCOLATE COATED CANDIES OR SOFT CANDIES, SUCH AS CARAMELS. (THESE COULD MELT UNDER CERTAIN CIRCUMSTANCES AND CAUSE DAMAGE TO THE GAME.)

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WARNING:
SHOCK HAZARD

Connect this game only to a grounded 3 wire outlet. If you have only a 2 wire outlet, we recommend you hire a licensed electrician to install a grounded outlet. Players may receive an electric shock if this game is not property grounded!

GAME INSPECTION

Your careful inspection is needed to supply the final touch of quality control. Please follow these steps to help us insure that your new game was delivered to you in good condition.

NOTE:
Do not plug game in yet:

1. Examine the exterior of the game cabinet for dents, chips, or broken parts.
2. Unlock and open the win door, inspect the interior of the game as follows:

Check that all plug-in connectors (on the game harness) are firmly seated. Re-plug any connectors found unplugged. Don't force connectors together. The connectors are keyed so they only go on in the proper orientation. A reversed edge connector will damage a PCB and will void your warranty. Check that all plug-in integrated circuits on the game PCB are firmly seated in their sockets. Remove power cord from inside coin door. Check the cord for any cuts or dents in the insulation.

3. Remove all wire ties installed to restrain crane head from movement during shipping. Perform a thorough visual inspectionof crane head assembly for any signs of damage.

INSTALLATION

1. Location

Power'	
Foreign	200 to 240 VAC @ 50 Hz
Domestic	110 @ 60 Hz
Temperature:	32 degrees to 100 degrees F (0 degrees to 38 degrees C)
Humidity: ,	Not over 95% relative

REGULATIONS • YOUR RESPONSIBILITY

Your game has been carefully designed and manufactured.

Our factory is capable of designing unique features or controls should your jurisdiction regulations require it.

The set-up and the daily operation of your game greatly influence the legal acceptance of your on-location crane business.

Your responsibilities include:

1. Not to alter or tamper with any factory settings, circuitry or programs without factory authorization. Doing so will nullify and void your warranty and may be criminal.

2. Ascertaining that each and every prize you place in the game's playfield can be retrieved and won by a player. (Consider that some prizes can be too small, large or heavy).

3. The machine must be checked frequently to insure that the prizes are not packed restricted or inaccessible to a player. If a prize cannot be retrieved by a skillful player in a reasonable amount of attempts, DO NOT place it within the game.

4. Checking with the jurisdiction authorities where you are operating, as to any required business license, games license or regulations. (You may also do this through your business legal advisor).

5. Inspect your game daily to ascertain all mechanisms are properly functioning. All decals and signs are posted and your prizes are well stocked. This will increase your play.

6. Your fair consideration with the customers is your best long-term repeat business.

5th GENERATION MAIN GAME BOARD

THEORY OF OPERATION

The main logic board utilizes a Rockwell R6511AQ (U13) single chip microcomputer. The heart of the R6511AQ is the 6502 microprocessor. It also contains RAM 32 programmable I/O lines and an on-chip oscillator which is used in conjunction with an external 4 MHZ crystal to provide the system clock.

The operating program is stored in a 2732A (U14) E-PROM allowing easy updating as additional features are developed and/or desired.

The DS1232 (U17) is a micro monitor which monitors the status of the power (Vcc) and software execution. As connected in this circuit. the Vcc line is monitored for any drop over 5%. Should the Vcc line drop below this level, processing is stopped until 250 ms after the Vcc line has recovered. Software execution is detected by monitoring the strobe pulse from pin 34 of the microprocessor. Should the strobe pulse be absent for a period of 1 second, a reset pulse will be supplied to pin 6 of the microprocessor.

Other integrated circuits include a 74LSO0 (U12) QUAD NAND GATE. a 74LS373 (U15) DATA LATCH, and twelve OPTOCOUPLERS. One section of the 74LSO0 is used as an inverter to provide the chip enable signal to the E-PROM. This signal is also utilized in conjunction with the 4 MHZ clock signal and an enable signal from pin 8 of the microprocessor, through the three remaining sections of the 74LSOO, to form a latch enable signal to control the U15 DATA LATCH. The pin 8 enable signal is "high" only during program execution. The DATA LATCH refreshes the display information presented on the CREDIT-TIMER DISPLAY at intervals controlled by the program. Presently this refreshing occurs at alternate intervals of 50 and 54 microseconds.

Two, 8 position, DIP switches are used to select game options. These switches are read ONLY during the first 50 microseconds of POWER UP. Switch bank 1 is read for the first 25 microseconds. then switch bank 2 for the next 25 microseconds. When changes are made in the switch settings, the POWER MUST BE RECYCLED BEFORE the. CHANGES BECOME OPERATIONAL. The stated times are approximate and may be changed by program modification.

Eleven of the 4N25 OPTOCOUPLERS (Ul through U11) are utilized for input isolation. Pin 1 of the 4N25 is the anode and pin 2 the cathode of a light emitting diode (LED). The output of these OPTOCOUPLERS is a NPN photo transistor, pin 5 being the collector and pin 4 the emitter. The base element of the photo transistor is available on pin 6, however we do not use it in our application. The LED anode (pin 1) of U1 and U2 are supplied from the 12 volt power source through 1000 ohm resistors, R28 and R29 respectively. The anodes of U3 through U11 (pin 1) are all supplied from the 13 volt power source through R22. a 1000 ohm SIP resistor package. The LED cathodes (pin 2) are connected through the various sensing and/or operation switches to ground. The output collectors are connected to input ports of the microprocessor, these lines being "pulled up" through R21. a 4.7K ohm SIP resistor package. The output emitters are connected to ground. Closure of a switch will create a current flow of approximately 10 milliamps through the LED. The resultant light will illuminate the photo transistor creating a logic "0" at the output, pin 5. The microprocessor, sensing this "low" condition will process it in according to the programmed instructions. Switch debouncing is accomplished through program operation.

The twelfth OPTOCOUPLER (U16) is utilized to provide an Output for lockout, Ticket Dispenser or a Bubble Gum Machine. Power for the LED in these OPTOCOUPLERS is supplied from the 5 volt source through a 330 ohm resistor, R11.

Seven connectors are used on this circuit board. They are: Two D-Sub. a 10 pin KK and four (4) 2 pin KK connecton. The fifteen pin connector (J2) provides AC voltage inputs, connections to the coin switches and connections to all Joy Stick switches. The twenty-five pin connector (JI) pmvides all connections to the crane head; motors, claw close solenoid and all sensing switches. The 10 pin connector (J7) provides connections for the CREDIT/TIMER Display. The two pin connector (J5) facilitates the Claw Close Button (California only) while (J6) provides for the connection of a Lockout Device, Ticket Dispenser or a Bubble Gum Machine. The remaining two pin connectors are J3 and J4. J3 is the input connector for the Dollar Bill Acceptor. It is located adjacent to R28 on the circuit board. Nearby is J4 which provides 12 volts to supply the coin mechanism lights.

IT IS IMPERATIVE MUCH CARE BE GIVEN TO THE PROPER CONNECTION TO J3 AND J4. **CONNECTION OF THE DBA TO J4 WILL RESULT IN DAMAGE TO THE DOLLAR BILL ACCEPTOR.** The proper wire colors for J3 are one pink and one purple wire. The connector must be oriented to place the purple wire adjacent to R28. The coin mechanism light wires are clear vinyl insulated with one silver colored conductor and one bronze colored conductor.

Two pin connector J5 is used as either a 12 volt power source or for photo-eye input / claw-close input sensing. Jumper block S3, located next to J5 is used to configure J5 for either operation. DO NOT ADJUST S3 unless such options are to be installed or removed.

Seven relays (Kl through K7) are utilized to provide the control functions for the three crane head motors and the claw closure coil. These relays are controlled by the microprocessor through driver transistors (Q1 through Q7). Coil transient spike suppression is accomplished be diodes D5 through D1 1. Relays K1 and K2 control the FRONT/BACK Motor, K3 and K4 the LEFT/RIGHT Motor, K5 and K6 the UP/DOWN Motor and K7 the COIL CLOSE Solenoid. K1, K3 and KS turn the power on and off to their respective motors while K2, K4 and K6 control the direction of operation. R1, R2 and R3 are 27 ohm resistors providing braking for their respective motors. C7, C8 and C9 suppress arcing of the relay contracts. Claw strength is controlled by adjustment of R40.

Three different'power supply levels are used on this logic board. 48 volts AC is supplied from a transformer to the bridge rectifier. (04). This supply is filtered with a 330 microfarad capacitor and supplies power to the crane head motors and claw close solenoid. An off board power supply is used for 12 and 5 volts DC. The, 12 volt supply provides power for relays, opto-isolators. coin meter, coin mechanism lights and credit timer. The 5 volt supply provides power for the complete logic system.

SOUND BOARD

THEORY OF OPERATION

The sound board is a microprocessor controlled board utilizing a 8031 micro controller, a 2764 E-PROM and a SAA1099 sound generator integrated circuit. Other integrated circuits include a 74HC573 data latch, a MC14490 to debounce the input circuits, a DS 1232 micro monitor, a TC4069 hex inverter, a LM363 audio amplifier, nine 4N25 opto-isolators, a 5 volt regulator and a 12 volt regulator.

The board contains a 15 pin male and a 15 receptacle female connector, as well as. a 25 pin male and 25 receptacle female connector. These male and female connectors are wired in parallel, pin for pin. They are brought to the sound board only to provide input signals for its operation. The sound board operates completely independent of the main logic board, its only tie being the inputs mentioned above. DIP switches are provided to match the options of the sound board to those of the main logic board to provide for compatible operation. Two additional connectors are included on the board, a RCA type phono connector for audio output and a two pin KK type connector for Dollar Bill Acceptor input information. This DBA input is wired, in the harness, in parallel with the DBA input to the main logic board.

The microprocessor receives input information from the MCI4490 and processes it in accordance with instructions from the E-prom. Address lines and data lines from the E-PROM to the microprocessor are multiplexed and the Data Latch is used to latch the address information. According to program instructions. information is sent from the microprocessor to the sound generator to produce music and other sound effects. The microprocessor operates at a crystal controlled clock frequency of 12 MHZ. The sound generator is clocked at a frequency of 4 MHZ which is received from the crystal oscillator formed by three sections of the Hex Inverted IC.

The DS1232 monitors the status of the power (Vcc) and the software execution. Should the Vcc line voltage drop more than 5%, processing is stopped until 250 ms after the Vcc line has recovered. Software execution is detected by monitoring the strobe pulse from pin 15 of the micro controller. Should the strobe pulse be absent for a period of 11 second, a reset pulse will be sent to pin 9 of the micro controller.

Opto-isolators 3 through 7 receive their information from switch closures and use 1000 ohm pull-up resistors to the 5 volt line. The testing techniques described in the troubleshooting portion for the main logic board will be applicable to these opto-isolators.

Opto-isolator pairs ISO 1 & 2 and ISO 8 & 9 receive their signals from directly across the FORWARD/BACK and LEFT/RIGHT motors. Their operation is such that one opto-isolator in each pair will be energized during motor movement. Which pair used depends on the direction of travel.

Twelve volts AC is supplied to the board through pins 6 and 7 of the 15 pin connector. It is converted to DC by the bridge rectifier, filtered by a 4700 MFD capacitor and supplied to both and 5 volt and 12 volt regulators. The outputs of these regulators are filtered and by-passed.

GAME BOARD DIP SWITCH SETTINGS *** CLASSIC PROGRAM ***

This program is designed to be utilized with 5th Generation Sear Claw/Clean Sweep main logic boards.

SWITCH ONE (1)

POSITION		FUNCTION
1	**OFF**	4 PLAYS FOR FOUR COIN CREDITS
	ON	5 PLAYS FOR FOUR COIN CREDITS

NOTE: This is a bonus for inserting multiple coins at one time. It will not be activated if game is played between inserting coins.

POSITIONS 2	3	QUARTERS PER COIN CREDIT
OFF	**OFF**	**ONE**
OFF	ON	TWO
ON	OFF	THREE
ON	ON	FOUR

4	5	6	GAMES PER COIN CREDIT
OFF	**OFF**	**ON**	**ONE**
OFF	ON	OFF	TWO
OFF	ON	ON	THREE
ON	OFF	OFF	FOUR
ON	OFF	ON	FIVE
ON	ON	OFF	SIX
ON	ON	ON	SEVEN

7	**a**	TIME FOR PLAY (SECOND)
ON	ON	TEN
OFF	OFF	FIFTEEN
OFF	ON	TWENTY
ON	OFF	TWENTY-FIVE

ALL FACTORY SETTINGS ARE UNDERLINED

SWITCH TWO (2)

POSITIONS

1	7	6	CONFIGURATION (Refer to next page for description)
OFF	OFF	OFF	C GAME, NON-CENTERING
OFF	ON	OFF	C GAME, CENTERING
OFF	OFF	ON	B GAME, NON-CENTERING
OFF	ON	ON	B GAME, CENTERING
ON	OFF	OFF	B+ GAME, NON-CENTERING
ON	ON	OFF	B+ GAME, CENTERING
ON	OFF	ON	A+B GAME

2	3	DOLLARS REQUIRED PER DBA CREDIT
OFF	OFF	ONE
OFF	ON	TWO
ON	OFF	THREE
ON	ON	FOUR

4	5	6	GAMES PER DBA CREDIT
OFF	OFF	ON	ONE
OFF	ON	ON	THREE
OFF	ON	OFF	TWO
ON	OFF	OFF	FOUR
ON	OFF	ON	FIVE
ON	ON	OFF	SIX
ON	ON	ON	SEVEN

ALL FACTORY SETTINGS ARE UNDERLINED

GAME CONFIGURATION DESCRIPTION

C GAME *** Joy stick gives full selection Of position on playing field. Operation of red joy stick button permits dropping of claw in small increments. When the claw dropping is impeded by plush or by reaching the limit of it's travel, claw closure and return to the home position is automatic. YOU MAY NOT RE-AIM after claw dropping is initiated.

B GAME *** Operation is the same as the C GAME except RE-AIMING of the claw is allowed after claw dropping is initiated. (This is known as the "dragger game.)

B+ GAME *** Joy stick operation is the same as the previous games. Operation of the RED joy stick button initiates automatic dropping of the claw, claw closure and return home.

NOTE: When the CENTERING option is seleded on the previous games, the claw will be automatically positioned in playing field center when credits are detected. Play cannot be commenced until this movement has occurred.

A+B GAME *** This game setting may be used with either the joy stick or the button control. CENTERING ootion IS NOT available. The daw may be moved FORWARD to the desired position When forward movement is stopped, this movement is locked. The claw may then be moved to the RIGHT. When RIGHT motion is stopped, automatic initialization of claw dropping, closure and return to home will occur. Likewise RIGHT motion may be initiated first. followed only by FORWARD movement.

SOUND BOARD: DIP SWITCH SETTINGS

IMPORTANT NOTES:

1. The Time -Out Option (SW3 on the Dip Switch located on the Sound board) should only be enabled when Game-Time Operation (SW1 and SW2) is configured lo Game Time on Game Board.

2. The Centering/Non-Centering Option (SW4) also has to be configured to the Game Board.

GAME TIME OPERATION

SW1	SW 2	OPERATION
ON	ON	10 SECONDS
ON	OFF	25 SECONDS
OFF	ON	20 SECONDS
OFF	OFF	15 SECONDS

TIME-OUT OPTION

SW3	OPERATION
OFF	TIME-OUT ENABLE
ON	TIME-OUT DISABLE

CENTERING / NON-CENTERING OPTION

SW 4	OPERATION
OFF	CENTERING PROGRAM
ON	NON-CENTERING PROGRAM

ALL FACTORY SETTINGS ARE UNDERLINED

TROUBLESHOOTING
MECHANICAL CONSIDERATIONS

Troubleshooting requires analyzing the complete system. The majority of problems will be traced to malfunction or misadiusted limit switches on the crane head assembly. There are four limit switches mounted on the crane head assembly. (for traceability we will refer to the item numbers used of the Crane Assembly drawing and parts list.) Switch 22 is the FRONT/BACK HOME LIMIT SWITCH. The actuating arm of this switch should be'formed to the position where it lays parallel to the face of the STOP SWITCH ACTUATOR (27A) while "just not" touching the actuator. This will permit operation of the switch when STOP ROD PLUNGER (27) is depressed approximately 5/16 inch. If greater than 5/16" depression of the stop rod is required to operate the switch, the bouncing action of the trolley on the front bumper may cause logic problems. Switch 25 is the LEFT/RIGHT HOME LIMIT SWITCH. Proper adjustment of-this switch provides for it's operation when the crane is approximately 5/32 inch from the STOP BUMPER (28). This adjustment is not critical. only requiring switch operation occurring early enough to assure motor turn off.

Refer to the drawing included in the MECHANICAL CHECK-OUT ILLUSTRATION for clarity in the proper installation of the following switches. Switch 103 is the UP LIMIT SWITCH. This switch is in the "closed" position while the claw is in the down position. When the claw is raised to it's upper position, the BRASS CABLE SLEEVE (74) is lifted. At approximately 1/4 inch lift, switch 103 will transfer to the "open" position. It is this transfer of state the microprocessor senses. When the microprocessor senses this transfer, the lifting motor will shut off and the "return to home" sequence will be initiated. The adjustment of this switch is not critical, however it is important no binding of the lever arm occurs. Switch 104 is the DOWN LIMIT SWITCH. It is actuated by the operation of the IDLER LEVER (63) when either the claw had "bottomed out" on the plush or the downward movement of the claw is arrested by the down limit knot in the claw string. Operation of this switch, through the microprocessor, reverses the direction of operation of the claw control motor, thus raising the claw. Failure or misadjustment Of this switch or binding in the operation of IDLER LEVER (63) will result in the claw string being wound backwards on CABLE SPOOL (54) which will stall the claw control motor.

Should the situation arise where the claw string is wound backwards, the following procedure should release it:

-Shut the machine POWER, OFF.
-Hold the lever arm on switch 103 DOWN in the actuated position and turn POWER, ON. This should release the tension on the string.
-After tension is released, turn machine POWER, OFF and complete rewinding and/or re threading by hand.

NOTE: The claw string may also be wound backwards due to problems on the logic board, i.e.: defective opto-isolator, relay, relay driver transistor, microprocessor. In this case the above procedure will not work until the logic board is replaced.

Occasionally the claw string may become unthreaded from the IDLER LEVER. Should this occur, the above procedure will work with the addition of holding the IDLER LEVER in the UP position.

Incorporated in the microprocessor is a "watch dog' provision which will shut down the logic boarc should any situation arise which stalls a motor or prevents the microprocessor from receiving a 'home' signal. This 'watch dog" allows 15 seconds for the completion of an operation before shutdown, At shut-down all relays will be de-energized and all motors stopped.

Other items to be periodically checked on the crane head assembly are:

Condition of the RUBBER '0' RING (1) drive belts.
Set screws in LARGE ROLLER (DRIVE) (6) for tightness
HELIX GEARS (21) for excess wear.
Condition of CLAW STRING
Condition of COIL WIRE (81)

TROUBLESHOOTING

ELECTRICAL CONSIDERATIONS

The resistance of the claw COIL (87A) may be measured at the white TERMINAL BLOCK (76) located near the lower left comer of the crane head. The coil should read approximately 50 Ohms. This terminal block is also the location to read the coil voltage. This reading will vary from approximately 20 volts to 50 volts, depending on the position of the coil strength potentiometer, the condition of the power supply, relay contacts and associated wiring.

"On the board" problems will normally consist of relay contact problems, failure of an opto-isolator or transistor. failure of a capacitor, power supply difficulties, or an occasional logic failure.

Relay contact problems will normally be indicated by proper operation of the relay mechanically with improper operation of the associated motor, etc. However if one of the capacitors, C7, C8, or C9 becomes "leaky" they may cause a similar results.

If a capacitor is "leaky" it will normally soon short out completely and cause foil damage to the board. During this "leaky" period the capacitor should be quite warm to the touch. If any capacitor on the board feels exceptionally warm compared to surrounding capacitors, it should be replaced immediately.

The following is a listing of the eleven control opto-isolators and their associated functions:

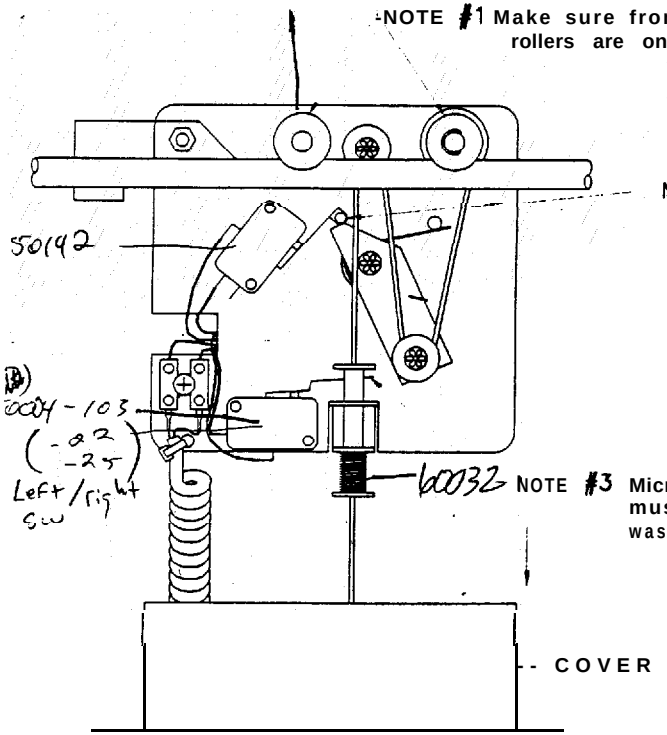
U1	Coin Mechanism Input
u 2	Dollar Bill Acceptor Input
u 3	Joystick Input - Forward
u 4	Joystick Input - Backward
U5	Joystick Input - Right
U 6	Joystick Input - Left
u7	Joystick Input - Claw Down (Push-button)
U8	Claw Up Limit Switch
U9	Claw Down Limit Switch
U10	Left Home Limit Switch
U11	Forward Home Limit Switch

In the normal "at Home" condition all inputs to the opto-isolators are open with thk exception of the LEFT and FORWARD Home Limit Switches. Measuring at pin 1 of opto-isolators 1 through 9 with a moderate impedance voltmeter should give a reading of approximately 12 volts.

Failure to obtain this reading would normally indicate; a failure of the 12 volt supply, open resistor pak R22 (resistor R26 or R29 in the case of U2 and U1 respectively). or open foil on the printed circuit board. Shorting pin 2 of the individual opto-isolators to ground should lower pin 1 of that opto-isolator to approximately 1.2 volts. Failure to obtain this reading would indicate an open LED in the opto-isolator. Pin 5 of these opto-isolators should be at a "1" logic level (approximately 5 volts) while pin 2 is open and should swing to a "0" logic level (approximately .2 to .5 volts) when pin 2 is shorted to ground. An easy method to perform these checks is lo actuate the various switches while monitoring the pin 5 voltage of the applicable opto-isolators. This provides a preliminary check of the opto-isolator, the switch and associated wiring and connectors. A failure to obtain the proper voltage swing at pin 5 would indicate a internal failure of the opto-isolator. either the LED or photo transistor, an open R24, R25 or R21 resistor pak or failure of the 5 volt power supply. In the "at home" condition, pin 5 of U10 and U11 should be a "0" logic level. Manually moving the crane from the home position should cause pin 5 of the applicable opto-isolator to swing to a "1" logic state.

The power supplies utilized are all conventional design and require no special discussion.

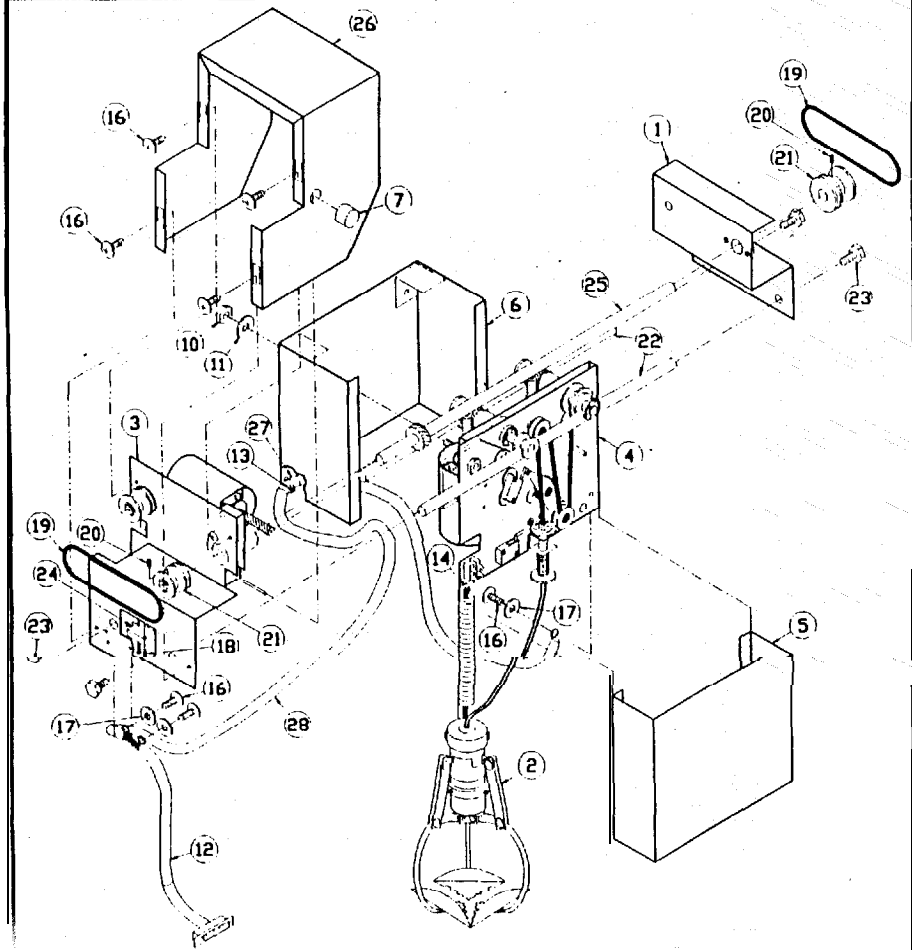
Set crane on track and make sure all rollers (wheels) are on the track rods.
Check-out micro switches
(Remove front cover by sliding down)


NOTE #1 Make sure front and back rollers are on tracks
NOTE #2 Make sure micro-switch roller is not trapped behind idler lever (switch roller should ride on edge of idler lever).
50142
60032
NOTE #3 Micro-switch lever must be under plastic washer
COVER

me boord check

A. Check to make sure thot the 15 pin connector and the 25 pin connector are secure.
8. Look for any physical damoge to boord.

DWG. NO. 5806



ITEM	QTY	P/N	DESCRIPTION
1	1	4823	ASSY, TROLLEY END PLATE
2	1	5808	ASSY, CLAW, CANDY CRANE
3	1	4820	ASSY, TROLLEY MOTOR,
4	1	4407	ASSY, DOUBLE MOTOR, STANDARD
5	1	1646	COVER, CRANE FRONT
6	1	5305	ASSY, MOTOR COVER
7	1	0027A	ACTUATOR, STOP SWITCH
8			
9			
10	1	60168	NUT, HEX, #10-32, ZINC
11	1	60046	WASHER, LOCK, #10 SPLIT, ZINC
12	1	3457	ASSY, HARNESS, CRANE, C.S.SINGLE/TRIPLE
13	1	60112	TIE, WIRE, 5" NATURAL NYLON
14	2	60057	TIE, WIRE, 4" NATURAL NYLON
15	10"	70055	TUBING, HEAT SHRINK, 1/8 DIA, BLACK
16	7	60156	SCREW, MACH, PPH, #8-32 X 1/4
17	3	60115	WASHER, FLAT, #8, ZINC
18	2	60110	SCREW, MACH, PPH, #4-40 X 1/2
19	2	60023	O-RING, RUBBER #H70-153
20	2	60025	SCREW, SS, #6-32 X 1/4
21	2	0006	ROLLER, LARGE DRIVE, DRILLED & TAPPED
22	2	5758	TUBE, CRANE TRACK, CANDY CRANE
23	4	60026	BOLT, HEX HD, 1/4-20 X 1/2, ZINC
24	1	50004	MICRO SWITCH, V3L-2227-D8
25	1	5807	ASSY, TROLLEY DRIVE SHAFT, CANDY CRANE
26	1	0012C	COVER, TROLLEY MOTOR
27	2"	70021	TUBING, PVC BLACK, 3/8 DIA. THIN WALL
28	1	70359	SPRING, FLEX CONDUIT, 27"

REV	DATE	ECY	CHANGE	BY	CHK

SMART IND. CORP MFG
1626 DELAWARE AVE.
DES MOINES, IOWA 50317

UNLESS OTHERWISE SPEC.
ALL DIMENSIONS IN INCHES
TOL: FRACTIONAL 1/32
ANGULAR. 1 DEG
DECIMAL: .XX .03
.XXX .010

DRAWN	GRAY	7/7/93
CHK		
APPVD		

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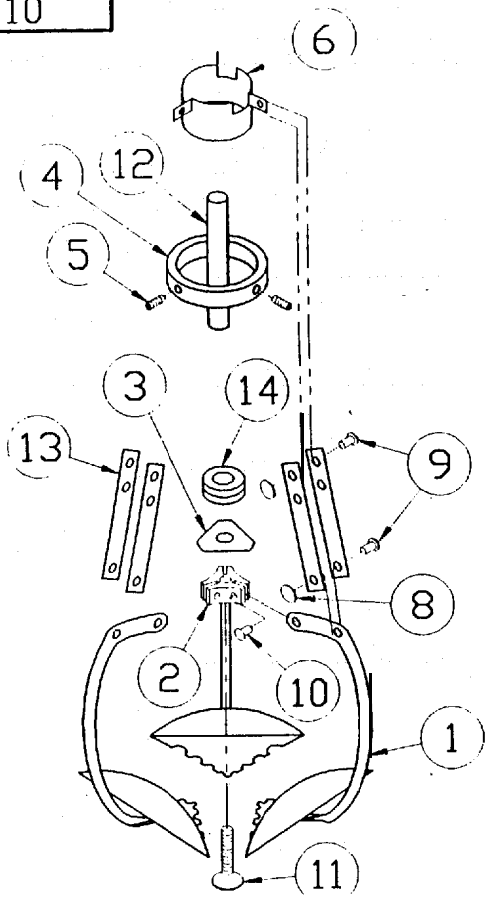
DO NOT SCALE THIS PRINT

TITLE ASSY, CRANE
CANDY CRANE

SIZE	SHT	OF	SCALE	DWG NO.
A			NONE	5806

UNIT	REQD	P/N	DESCRIPTION
CC	1	CC	FINAL ASSY

DWG. NO. 5810



ITEM	QTY	P/N	DESCRIPTION
1	3	5813	WELDMENT, CLAW FINGER, CANDY CRANE
2	1	0097	SPIDER, CLAW RETAINER
3	1	0096	WASHER, CLAW ADJUSTING
4	1	0091	RING, CLAW ADJUSTING
5	2	60041	SCREW, SS, #6-32 X 3/16
6	1	0090	SLIDE, CLAW, NICKEL
7			
8	6	60037	WASHER, 3 MM STAR LOCK W/CAP
9	6	60038	RIVET, SOLID ALUMINUM, 1/8 X 1/4 L.
10	3	60035	RIVET, SOLID ALUMINUM, 1/8 X 5/8 L.
11	1	60033	SCREW, MACH, PFH, #10-32 X 1 1/4, ZINC
12	1	0095A	PLUNGER, CLAW ACTUATOR
13	6	0100	RETAINER, CLAW FINGER, REGULAR
14	1	60125	GROMMET, 7/16 DIA. RUBBER

NOTES: 1) ALL CLAW FINGERS ARE ASSEMBLED IN SAME MANNER

UNIT	REQD	P/N	DESCRIPTION
CC	1	5808	ASSY, CLAW, CANDY CRANE

REV	DATE	EC#	CHANGE	BY	CHK

SMART IND. CORP.,MFG.
1626 DELAWARE AVE.
DES MOINES, IOWA 50317

UNLESS OTHERWISE SPEC. ALL DIMENSIONS IN INCHES TOL: FRACTIONAL 1/32 ANGULAR. 1 DEG DECIMAL: .XX .03 .XXX .010	DRAWN	GRAY	7/8/93
	CHK		
	APRVD		

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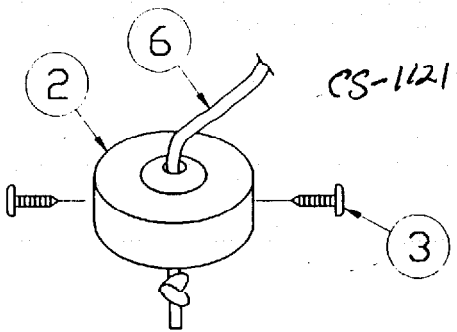
DO NOT SCALE THIS PRINT

TITLE ASSY, SUB, CLAW CANDY CRANE

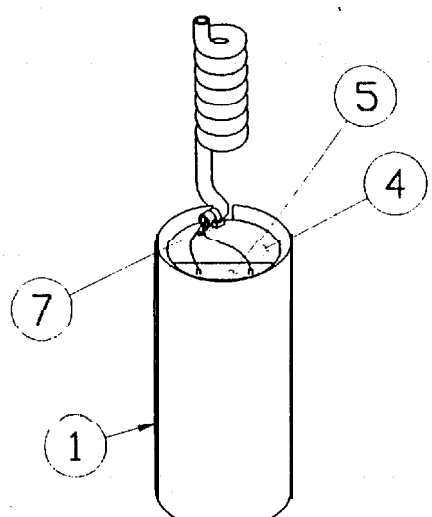
A SIZE	SHT OF	NONE SCALE	DWG. NO. 5810

DWG. NO. 5812



CS-1121

ITEM	QTY	P/N	DESCRIPTION
1	1	0093-A	ASSY, COIL HOUSING, WELDMENT
2	1	0086	CAP, COIL HOUSING
3	2	60044	SCREW, PPH, #8 X 3/8, ZINC
4	1	0084	INSULATOR, COIL WIRE
5	1	5814	ASSY, COIL, CANDY CRANE
6	48"	70168	STRING, BRAIDED NYLON
7	1	60057	TIE, WIRE, 4" NATURAL NYLON
8	2"	70439	TAPE, 2" DUCT GREY



NOTE: 1) COVER COIL WIRE INSULATOR WITH DUCT TAPE

REV	DATE	EC#	CHANGE	BY	CHK

SMART IND. CORP., MFG.
1626 DELAWARE AVE.
DES MOINES, IOWA 50317

UNLESS OTHERWISE SPEC. ALL DIMENSIONS IN INCHES TOL: FRACTIONAL 1/32 ANGULAR 1 DEG DECIMAL: .XX .03 .XXX .010	DRAWN	G R A Y	7/8/93
	CHK		
	APRVD		

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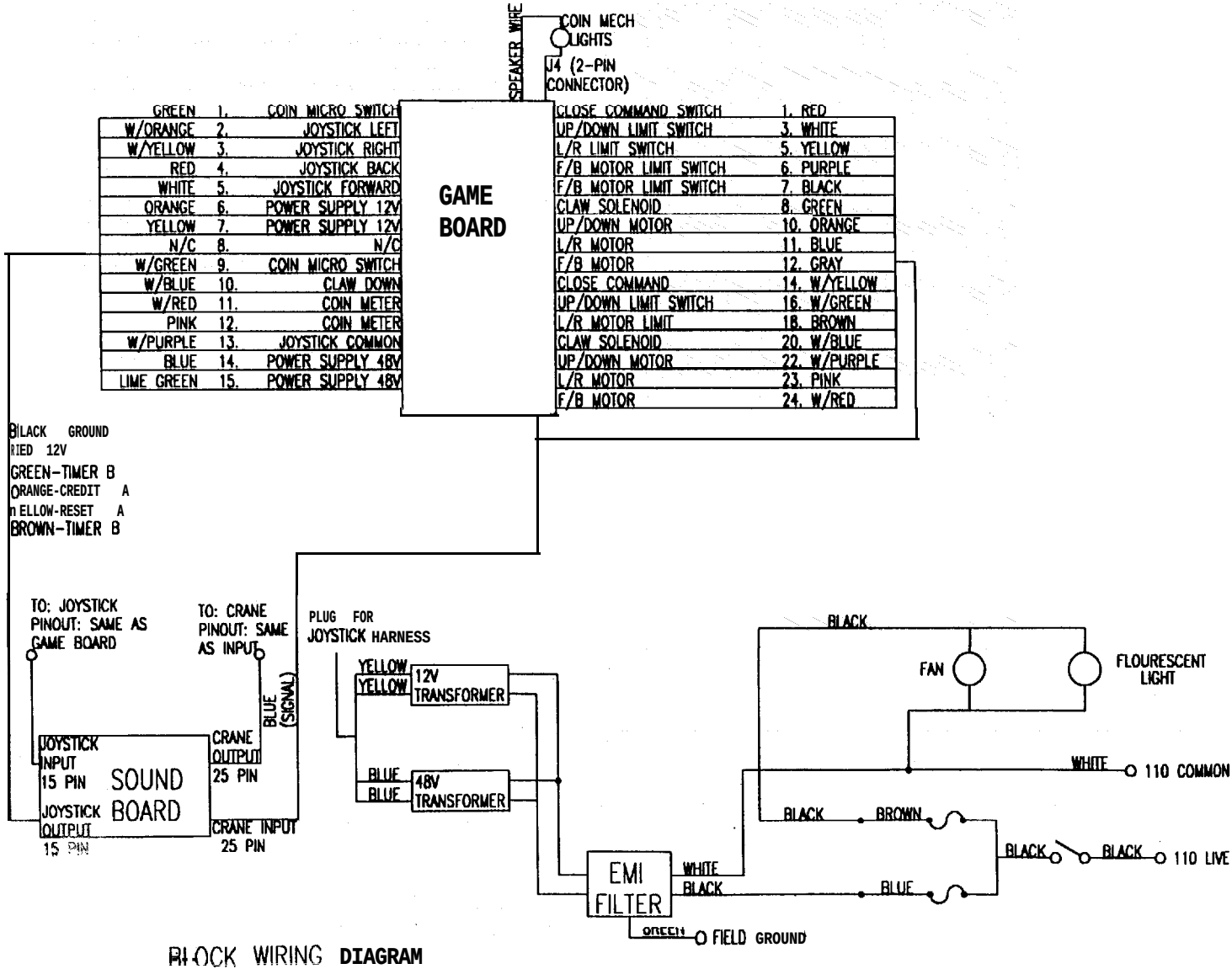
DO NOT SCALE THIS PRINT

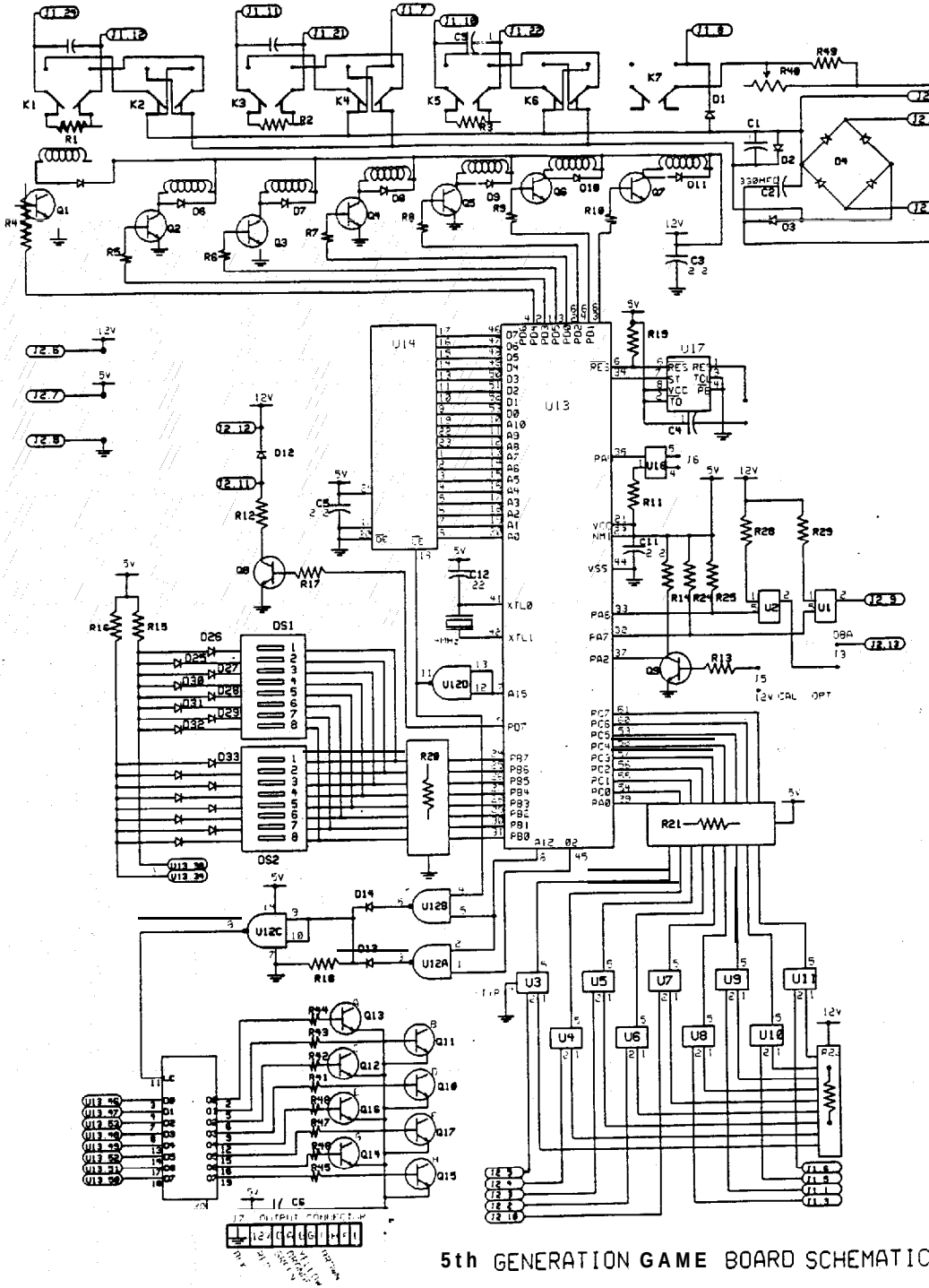
TITLE ASSY, COIL HOUSING CANDY CRANE

SIZE	SHT	OF	SCALE	DWG. NO.
A			NONE	5812

UNIT	REQD	P / N	DESCRIPTION
CC	1	5808	ASSY, COIL HOUSING, CANDY CRANE



BLOCK WIRING **DIAGRAM**



5th GENERATION GAME BOARD SCHEMATIC

5th GEN. GAME'BOARD

PARTS LIST

SYMBOL	COMPONENT	DESCRIPTION
- - - -	PCB	5TH GENERATION. BEAR CLAW
U1 - U11, U16	IC	4N25 OPTO COUPLER
u12	IC	74LSOO, QUAD NAND GATE
U13	IC	R6511AQ MICROPROCESSOR
U14	IC	M2732AFI EPROM
U15	IC	74LS373 a BIT DATA LATCH
U17	IC	DS1232 WATCHDOG
Q1 - Q17	TRANSISTOR	PN2222
D0 - D3	DIODE	1 N4001
D4	RECTIFIER	KBL02 BRIDGE
D5 - D15, D17 - D32	DIODE	1N914 OR 1N4148
RI - R3	RESISTOR	27 OHM 1/4 WATT
R4 - R10, R13 - R16, R19,R41 - R48	RESISTOR	3.9K OHM 1/4 WATT
R11, R17	RESISTOR	330 OHM 1/4 WA-IT
R12	RESISTOR	27 OHM 1/2 WATT
R18, R28, R29	RESISTOR	1 K OHM 1/4 WATT
R20	RESISTOR PACK	22K OHM SIP
R21	RESISTOR PACK	4.7K OHM SIP
R22	RESISTOR PACK	1 K OHM SIP
R24. R25	RESISTOR	4.7K OHM 1/4 WA-IT
R26, R27, R30 - R38	RESISTOR	1M OHM 1/4 WATT
R40	POTENTIOMETER	125 OHM 12.5 WATT
C1, C7 - C9	CAPACITOR	0.1 UF 630V POLY

SYMBOL	COMPONENT	DESCRIPTION
c2	CAPACITOR	330 UF 1 OOV ELEC.
c3, C5, C10, CI 1	CAPACITOR	2.2 UF 16V TANT.
C4, C6, C17	CAPACITOR	0.1 UF 50V CERAMIC
C12	CAPACITOR	33PF 1 OOV CERAMIC
J1	CONNECTOR	25 PIN D-SUB PLUG
J2	CONNECTOR	15 PIN D-SUB RECEPTACLE
J3 - J6	CONNECTOR	2 PIN KK, ,156 HEADER
J7	CONNECTOR	10 PIN KK, .156 HEADER
U14 (SOCKET)	SOCKET	24 PIN, .6 DIP
S1, s2	SWITCH	SLIDE, BD08 DIP
K1 - K7	RELAY	1 2VDC, PC MOUNT, RK3013
Y1	CRYSTAL	4 MHZ
....	BRACKET	BRACKET FOR 12.5 WATT POT.
....	SCREW	MACH, PPH. 4-40 NYLON INSERT
....	NUT	LOCK, 4-40 NYLON INSERT
s3	CONNECTOR	3 PIN, .100 HEADER
....	CONNECTOR	JUMPER BLOCK, 0.100

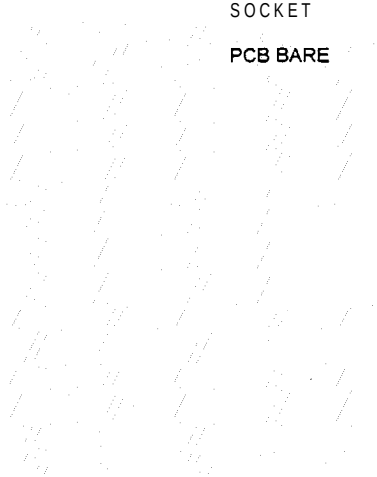
CRANE SOUND BOARD PARTS LIST

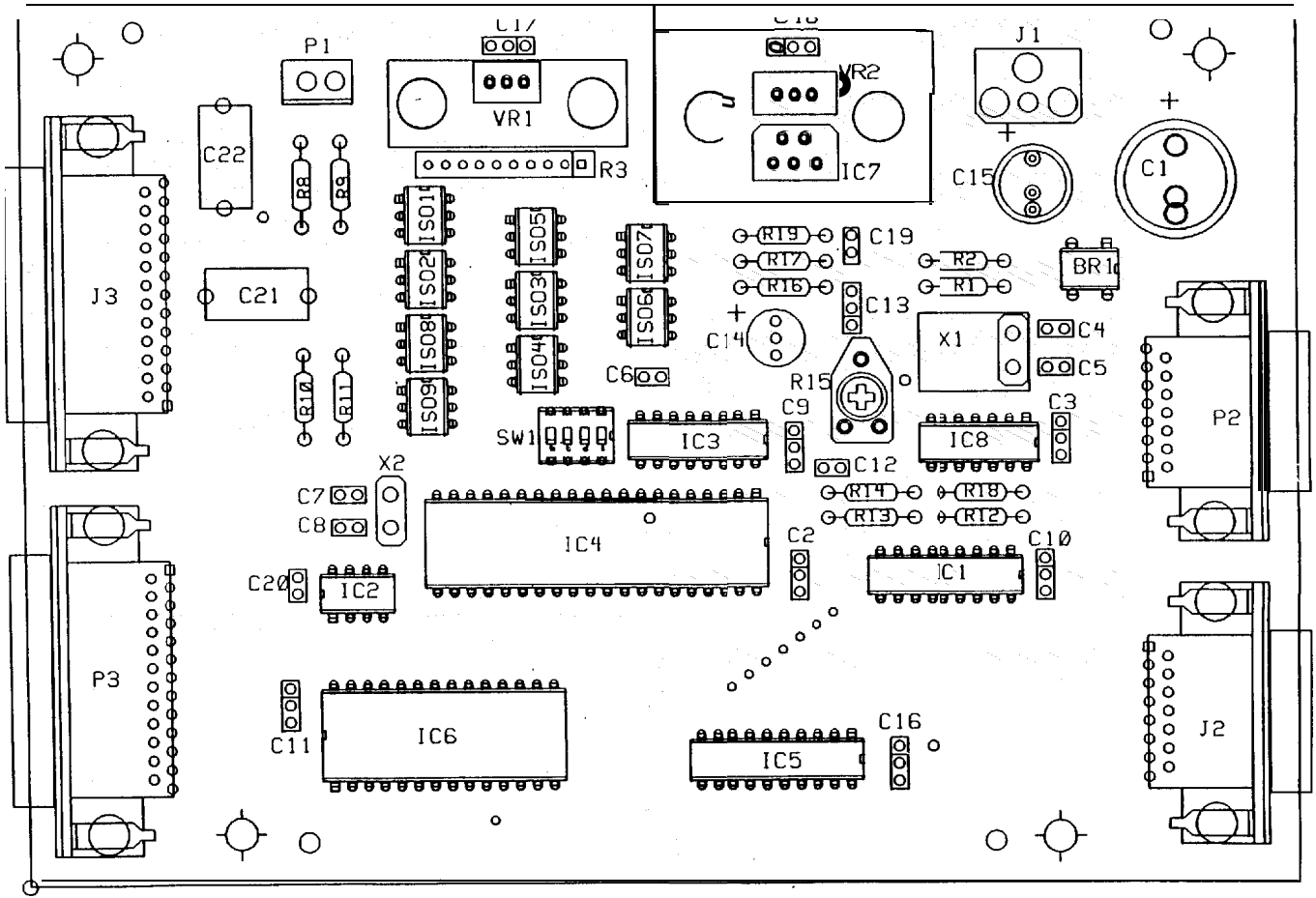
3-6-90

SYMBOL	COMPONENT	DESCRIPTION
C4, C5, C7, ca	CAPACITOR	33 PF CERAMIC
C 6	CAPACITOR	.001 MFD CERAMIC
C12	CAPACITOR	.0047 MFD CERAMIC
C3, 9. 10, II. 16.20	CAPACITOR	.1 MFD CERAMIC
C21, C22	CAPACITOR	.1MFD 630 VOLT POLYESTER .6 LEAD SPACING
C19	CAPACITOR	.22 MFD CERAMIC
c2	CAPACITOR	2.2 MFD 16 VOLT TANTALUM
C13	CAPACITOR	IO MFD 16 VOLT TANTALUM
C17, 18	CAPACITOR	22 MFD 16 VOLT TANTALUM
C14	CAPACITOR	470 MFD 25 VOLT ELECT.
C15	CAPACITOR	1000 MFD 25 VOLT ELECT.
CI	CAPACITOR	4700 MFD 35 VOLT ELECT.
J1	CONNECTOR	PHONO JACK PC MOUNT
XI	CRYSTAL	4.0 MHZ TYPE MP-1
x2	CRYSTAL	12 MHZ TYPE MP-1
IC7 ,	IC	LM383 AUDIO AMPLIFIER (NATIONAL)
IC1	IC	STEREO SOUND GENERATOR SAA1099
IC2	IC	DS1232 MICRO-MONITOR
IC6	IC	MC2764A-2F1 E-PROM (250 NS MAX. ACCESS TIME)
IC8	IC	TC4069UBP HEX INVERTER
IC3	IC	MC14490 HEX CONTACT BOUNCE ELIMINATOR
IC4	IC	P8031AH MICROPROCESSOR

VR1	IC	L7805 5 VOLT REGULATOR
VR2	IC	L7812 12 VOLT REGULATOR
IC5	IC	74LS573 OCTAL BUS LATCH
R15	POTENTIOMETER	10K OHM SO WATT CERMET TRIMMER, SINGLE TURN
BR1	RECTIFIER	VM08 BRIDGE
RI9	RESISTOR	0 OHM
R16	RESJSTOR	12 OHM 5% 1/4 WATT CARBON FILM
R1, 17	RESISTOR	330 OHM 5% 1/4 WATT CARBON FILM
RI8	RESISTOR	470 OHM 5% 1/4 WATT CARBON FILM
R13	RESISTOR	1000 OHM 5% 1/4 WATT CARBON FILM
R8.9, 10, 11	RESISTOR	2200 OHM 5% 1/4 WATT CARBON FILM
R 1 4	RESISTOR	8200 OHM 5% 1/4 WATT CARBON FILM
R12	RESISTOR	10K OHM 5% 1/4 WATT CARBON FILM
R 2	RESISTOR	10 MEG OHM 5% 1/4 WATT CARBON FILM
R 3	RESISTOR PAK	1000 OHM SIP
SW1	SWITCH	DIP SW., 4 POSITION SLIDE SPST
VR1	HEATSINK	WAKEFIELD 63715-ADP
IC7/VR2	HEATSINK	WAKEFIELD 64715-ADP
P3	CONNECTOR	25 PIN DSUB MALE
J3	CONNECTOR	25 PIN DSUB FEMALE
PI	CONNECTOR	2 PIN 0.156 KK. LOCK
J2	CONNECTOR	15 PIN DSUB, FEMALE
P2	CONNECTOR	15 PIN DSUB, MALE
---	HARDWARE	SCREW, MACH, PPH, 4-40 X 114.2

...	HARDWARE	NUT, LOCK, 4-40 NYLON-INSE
IC4	SOCKET	40 PIN. DIP K
IC1	SOCKET	18 PIN. DIP K
IC6	SOCKET	28 PIN. DIP K
...	PCB BARE	CRANE SOUND BOARD



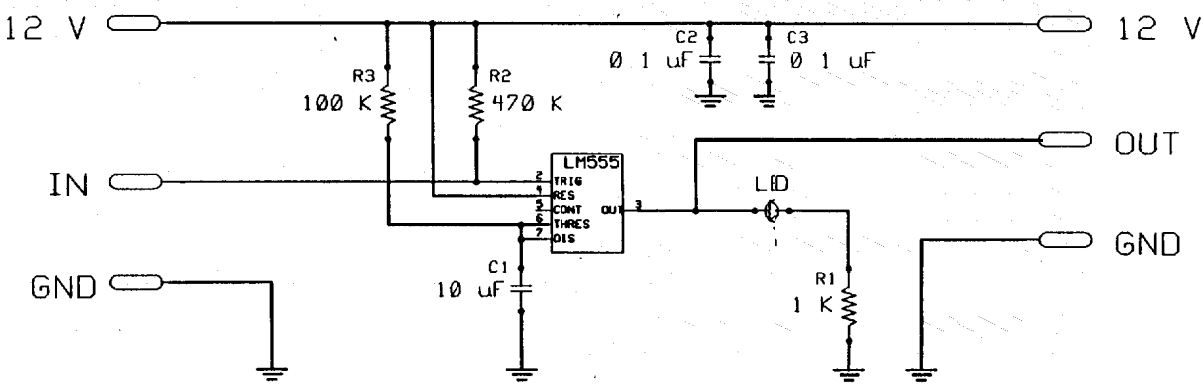


CRANE SOUND BOARD LAYOUT

PART #1947

3481

PHOTOEYE INTERFACE BOARD



3481	
SMART INDUSTRIES	
GAME CRANES	REVISION A
DATE 7/10/93	DRAWN BY BJS

PHOTOEYE INTERFACE BOARD #3481

7/1/93

SMART P/N	QTY	DESCRIPTION	VALUE	REFERENCE
3480	1	PCB. PHOTOEYE INTERFACE		
50081	1	LM555H TIMER		U1
50120	1	RESISTOR	1 K OHM. 1/4 W	R1
50597	1	RESISTOR	470 K OHM, 1/4 W	R2
50087	1	RESISTOR	100 K OHM,1/4 W	R3
50098	1	CAPACITOR, ELECTROLYTIC	10 UF, 16 V	Cl
50094	2	CAPACITOR. CERAMIC	0.1 UF. 50 V	C2, c3
50474	1	LTL • 4224 LED RED		LED
50137	2	4 PIN. 0.158 CONNECTOR		P3, P4
50203	1	5 PIN. 0.156 CONNECTOR		P2
50206	1	6 PIN. 0.156 CONNECTOR		P1

PHOTOEYE INTERFACE LAYOUT